

# WATERSHED

## Science & Engineering

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## Memorandum

**To:** Chehalis River Basin Flood Authority  
**From:** Larry Karpack, WATERSHED Science & Engineering (WSE)  
**Date:** 1/13/2012  
**Re:** **Proposed Additions to Detailed Work Plan**

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Task 6 of the “Detailed Work Plan” for the Lower Chehalis River Hydraulic Model Development Project includes an optional allowance to refine hydraulic modeling of tributaries to the Chehalis River, with highest priority given to the Black, Satsop, Skookumchuck and Newaukum Rivers. The intent of this task was to allow modeling and analysis of tributary systems as necessary to support flood relief planning and downstream impact analyses. The task envisioned survey data collection, hydrologic analysis, and/or hydraulic modeling and analysis. Based on reviewing the available survey work and information available on all four tributaries, additional survey work at this time is recommended on both the Skookumchuck and Newaukum Rivers. Funding for this potential work is already included in the WSE budget.

### 1. Skookumchuck River

The City of Bucoda and Thurston County have identified specific flooding problems along the Skookumchuck River at Bucoda. Based on observations during past events they believe that the flooding in Bucoda is caused or exacerbated by hydraulic constrictions at the BNSF railroad trestle and may also be impacted by a levee. The following tasks are recommended to update and refine the existing hydraulic model of the Skookumchuck River in order to investigate potential alternatives for flood damage reduction.

**Task a - Obtain new channel survey data for the Skookumchuck River in the vicinity of Bucoda (RM 9.8 -12)** - The Corps Twin Cities hydraulic model includes a limited number of cross sections in this reach based on the 1989 Corps model, with two additional channel cross sections (at the railroad trestle, RM9.8, and in-channel at RM 11.92) based on the Corps survey completed by Minister Glaeser in 2001. After 20 years, the bulk of this data is likely out of date with current reach conditions, and a finer resolution through the town of Bucoda is required to adequately investigate hydraulic impacts of flood reduction alternatives. Given these facts, additional survey data collection to support model refinement for this reach (Task b) is needed.

Survey data collection will be conducted by PGS.

**Projected Sub-Task Completion Date:** February 15, 2011.

**Sub-Task Budget:** \$6,000

**Task b - Refine model of Skookumchuck River** - This reach is in the Twin Cities hydraulic model and additional model development for this reach is not currently part of the Corps GI study

contract. Past modeling work by the Corps and/or FEMA did not include georeferencing or otherwise cleaning up the model above RM 6.4. This task entails georeferencing the existing Skookumchuck hydraulic model (from RM 6.42 to 21.77) and re-cutting the channel overbanks throughout the model using 2002 PSLC LiDAR (or more recent LiDAR data if available). The model will then be refined in the vicinity of Bucoda (RM 9.8 - 12) using the cross section data described in Task a. Some level of model validation or calibration will be conducted; however, the validation effort is not expected to be significant.

The updated model will be used to evaluate the potential impacts of bridge and/or levee modification on flooding and storage in Bucoda and downstream.

Watershed Science & Engineering will be primarily responsible for this sub-task

***Projected Sub-Task Completion Date:*** March 1, 2011.

***Sub-Task Budget:*** \$15,475.00

## **2. Newaukum River**

Lewis County has indicated that additional hydraulic analysis of the Newaukum River would be beneficial to their flood damage reduction planning efforts. The main stem of the Newaukum River (downstream of the North Fork confluence, approximately 10.6 river miles) was last modeled by the Corps of Engineers for FEMA in 2006. However, the model developed for that study was not georeferenced (i.e. tied in to topographic mapping). Further, only a portion of the 2006 Newaukum River model was incorporated into the Twin Cities model completed by NHC for FEMA in 2010. The following task is recommended to update and incorporate the existing hydraulic model of the Newaukum River into the Chehalis River model being developed for this study by WSE and WEST.

**Task c - Refine and incorporate model of Newaukum River** – NHC developed and delivered to the Corps of Engineers in 2001 an HEC-RAS model of the Newaukum River, using data from various sources but primarily taken from a UNET model developed in the 1990s by PIE. This model covers the reach from the confluence with the Chehalis River upstream as far as the North Fork Newaukum River. WSE will use this model and, if available, cross-section layouts from the Corps of Engineers or from NHC to georeference and re-cut cross sections using 2002 PSLC LiDAR. Some cross-section locations may need to be estimated, using river mile stationing and reach lengths, with re-cut overbanks possibly following different (though hydraulically appropriate) alignments. Channel data from the existing model cross sections are from varied sources, including 1998 surveys by the Corps of Engineers, 1997 surveys by NHC, and older HEC-2 modeling. These cross-sections will be retained – no new survey is proposed for this task. Some level of model validation or calibration will be conducted; however, the validation effort is not expected to be significant.

Watershed Science & Engineering will be primarily responsible for this sub-task

***Projected Sub-Task Completion Date:*** March 1, 2011.

***Sub-Task Budget:*** \$5,200.00